The Role Of Security And Trust In The Adoption Of Online Tax Filing

By: Lemuria Carter, Ludwig Christian Shaupp, **Jeffrey Hobbs**, and Ronald Campbell

Abstract

Purpose – The purpose of this paper is to investigate the influence of six determinants on taxpayers' intention to adopt e-file systems. The proposed model integrates technology adoption factors from the unified theory of acceptance and use of technology (UTAUT) model with personal perceptions on trust, efficacy, and security into one parsimonious yet explanatory model of e-file adoption. Design/methodology/approach – A survey was administered to 304 US taxpayers to capture their perceptions of e-filing. The survey was developed using existing scales in the literature. Responses were measured on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The results were tested using multiple linear regression analysis. Findings – The findings of this research show that theoretical constructs from the UTAUT model are well suited in explaining intentions to use multiple e-government services. Specifically, the results indicate that three factors from the UTAUT model (performance expectancy, effort expectancy, and social influence) play a significant role in predicting taxpayers' e-filing intentions. More importantly, the research findings indicate that personal factors (web-specific self-efficacy (WSSE) and perceived security control), along with UTAUT factors, have a significant impact on taxpayers' e-file intentions. The proposed model explains 63.5 percent of the variance in taxpayers' e-file intentions. Research limitations/implications – This study contributes to the literature by integrating determinants from the UTAUT model with personal perception factors to explain e-file adoption. This merging of UTAUT with theories, such as social cognition, that emphasize human perception, is the direction that must be taken by researchers in an effort to understand taxpayers' intentions to adopt e-file systems. While the proposed model explained 63.5 percent of the variation in e-file use intention, there are limitations to this research. The participants in this research are not sufficiently diverse in culture, socio-economic level, etc. and 89 percent of the research participants are Caucasian. In addition, the participants were recruited from limited geographical locations. The strength of the model should be validated using more diverse research participants that will increase the variation in the data collected. Originality/value – The paper presents a parsimonious, yet integrated, model of e-file diffusion. The integration of adoption factors with personal perceptions of trust, efficacy, and security represents a significant step forward in explaining e-file adoption.

Lemuria Carter, Ludwig Christian Shaupp, **Jeffrey Hobbs**, Ronald Campbell, (2011) "The role of security and trust in the adoption of online tax filing", Transforming Government: People, Process and Policy, Vol. 5 Issue: 4, pp.303-318, https://doi.org/10.1108/17506161111173568. Publisher version of record available at: https://www.emeraldinsight.com/doi/full/10.1108/17506161111173568

The role of security and trust in the adoption of online tax filing

Lemuria Carter
Department of Accounting, North Carolina Agricultural and Technical State University, Greensboro, North Carolina, USA

Ludwig Christian Shaupp
Department of Accounting, West Virginia University, Morgantown, West Virginia, USA

Jeffrey Hobbs
Walker College of Business, Appalachian State University, Boone, North Carolina, USA, and

Ronald Campbell
Department of Accounting, North Carolina Agricultural and Technical State University, Greensboro, North Carolina, USA

Abstract

Purpose – The purpose of this paper is to investigate the influence of six determinants on taxpayers' intention to adopt e-file systems. The proposed model integrates technology adoption factors from the unified theory of acceptance and use of technology (UTAUT) model with personal perceptions on trust, efficacy, and security into one parsimonious yet explanatory model of e-file adoption.

Design/methodology/approach – A survey was administered to 304 US taxpayers to capture their perceptions of e-filing. The survey was developed using existing scales in the literature. Responses were measured on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The results were tested using multiple linear regression analysis.

Findings – The findings of this research show that theoretical constructs from the UTAUT model are well suited in explaining intentions to use multiple e-government services. Specifically, the results indicate that three factors from the UTAUT model (performance expectancy, effort expectancy, and social influence) play a significant role in predicting taxpayers' e-filing intentions. More importantly, the research findings indicate that personal factors (web-specific self-efficacy (WSSE) and perceived security control), along with UTAUT factors, have a significant impact on taxpayers' e-file intentions. The proposed model explains 63.5 percent of the variance in taxpayers' e-file intentions.

Research limitations/implications – This study contributes to the literature by integrating determinants from the UTAUT model with personal perception factors to explain e-file adoption. This merging of UTAUT with theories, such as social cognition, that emphasize human perception, is the direction that must be taken by researchers in an effort to understand taxpayers' intentions to adopt e-file systems. While the proposed model explained 63.5 percent of the variation in e-file use intention, there are limitations to this research. The participants in this research are not sufficiently diverse in culture, socio-economic level, etc. and 89 percent of the research participants are Caucasian. In addition, the participants were recruited from limited geographical locations. The strength of the model should be validated using more diverse research participants that will increase the variation in the data collected.

Originality/value – The paper presents a parsimonious, yet integrated, model of e-file diffusion. The integration of adoption factors with personal perceptions of trust, efficacy, and security represents a significant step forward in explaining e-file adoption.

Keywords United States of America, E-government, Taxes, E-file, Technology adoption, Trust, Security

Paper type Research paper

Introduction

According to Teodora (2008), "e-government refers to the provision of online public services to citizens and businesses." These services include (but are not limited to) registration for healthcare, education, or unemployment benefits, as well as online alerts for public procurements or funding opportunities. There is no question that the possibility for government's efficient and effective use of the internet is unlimited. Helen Margetts, one of the leaders of a research team on Parliament Government on the internet, concluded:

> There is great potential for government organizations to use the internet imaginatively, for example to identify what people want to do on line. That way services can be designed around the citizen and citizens can interact with government using the type of applications they use in everyday life (National Audit Office Report, 2007).

In a satisfaction survey administered by ForeSee Results, the public's satisfaction with e-government sites measured in at 75.2 on the American Customer Satisfaction Index's 100-point scale (Federal Computer Weekly Staff, 2010). Maurer (2010) states that:

> [. . .] the past few years have seen significant growth in the number of e-government services available over the Internet. The potential for the Internet to significantly enhance the way that individuals and organizations conduct business with e-Government is now more evident than ever before.

Regarding e-file, Baumgarten and Chui (2009) note that in many countries more than 70 percent of the taxpayers file electronically. In the USA, the Internal Revenue Service (IRS) e-file system is over 20 years old. The system debuted in 1990 and is currently being used by approximately two-thirds of the country's taxpayers. It is interesting to note that the IRS was ranked no. 5 among the ten top-ranking federal web sites (West, 2008). The filing season statistics for 2009 and 2010 indicate that the number of people utilizing e-file systems is increasing. According to the IRS, the total number of e-filed returns in 2009 and 2010 were 91 and 93.4 million, respectively, a 2.8 percent increase (IRS.gov, 2010).

Congress passed the IRS Restructuring and Reform ACT of 1998 that charged the IRS to set the goal to have 80 percent of all tax returns filed electronically by 2007 (Culligan *et al.*, 2002). In 2010, IRS statistics show that approximately 72.3 percent of all tax preparers e-filed their returns, an increase from 69.1 percent in 2009. The IRS has not withdrawn its 80 percent goal. Rozen (2009) asserts the IRS continues to aggressively push the e-file program and is trying to reach 2014 with 80 percent of the returns filed electronically.

E-government diffusion has been explored by numerous researchers (Guijarro, 2007; Bélanger and Carter, 2009; Janssen *et al.*, 2009; Tan and Thoen, 2001). The key to successful e-government is the implementation of systems that are utilized and meet users' needs. The electronic filing of income tax returns (the e-file program) has grown into a congressional initiative; however, its outright adoption by citizens has yet to be fully achieved. E-filing has the potential to improve the overall process of tax filing for the individual filer while at the same time reducing the cost to both taxpayers and tax collection agencies (Fletcher, 2002).

This research explores the impact of taxpayer perceptions on the utilization of electronic tax filing systems. Given the government's large investment in the e-file program and its 80 percent adoption goal that has yet to be reached, the identification

of these factors is necessary for effective and efficient development of e-file systems that meet the needs of taxpayers. According to the literature, both technology adoption factors (Gefen *et al.*, 2003; Pavlou, 2003; Venkatesh *et al.*, 2003; Carter and Belanger, 2005; Fu *et al.*, 2006; Horst *et al.*, 2007; Hung *et al.*, 2007; Al Awadhi and Morris, 2008; Schaupp *et al.*, 2010) and personal perceptions (Bandura, 1997; McKnight *et al.*, 2002; Pavlou, 2003) have an impact on technology diffusion. Hence, we propose the following research question:

RQ1. What are the dominate factors that significantly influence, i.e. increase, taxpayers' intention to use e-file systems?

The primary objectives of this study are:

(1) to identify the impact of the unified theory of acceptance and use of technology (UTAUT) factors on e-file adoption; and

(2) to identify the impact of personal factors such as web-specific self-efficacy (WSSE), perceived security control (PSC) and trust of independent intermediary on intention to e-file.

Building on previous technology acceptance and e-government studies, we develop a model aimed at further understanding US taxpayers' intention to use an e-file system. Specifically, a survey is conducted to examine taxpayers' intentions to use an IRS endorsed e-file system. The US e-file system is a prime example of a current e-government service where citizens' adoption expectations are presently lagging behind.

This paper contributes to the literature by empirically validating the UTAUT model in a voluntary usage e-government service context. This study posits that by integrating literature on IT adoption (UTAUT) with literature on personal perceptions (WSSE, PSC, and trust of independent intermediary) researchers and government can gain a more comprehensive understanding of e-file adoption in the USA.

Literature review

How and why individuals choose to adopt new technologies has forever been the focal point of IS research. Within this broad area of research, there is a core area of literature that focuses on intention. The UTAUT is one of the most predominant and comprehensive models existing in the literature to date. It is founded on eight theoretical models: the theory of reasoned action (TRA), the technology acceptance model (TAM), the motivational model, the theory of planned behavior (TPB), a model combining the TAM and the TPB, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory. The purpose of UTAUT is to understand system usage (Venkatesh *et al.*, 2003). It has been utilized in prior research investigating e-government service adoption (Al Awadhi and Morris, 2008).

The UTAUT model

The UTAUT model integrates the eight theoretical models noted above and is made up of four core factors: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (Venkatesh *et al.*, 2003). The unified theoretical model was empirically tested in four diverse organizational settings (entertainment, telecomm, banking, and public administration industries) over a period of six months

(Venkatesh *et al.*, 2003). Of the four core determinants, PE, EE, and SI significantly predict intention. The UTAUT model is well suited for the context of this study in that the IRS is the organizational function of the government which collects taxes. Taxes should be paid by all citizens on an annual basis to the IRS. The payment of taxes is mandatory; however, the choice to e-file via an IRS sponsored e-file system is a voluntary usage context. Therefore, it is in this setting that the use of the UTAUT model is best suited for an investigation into the use and adoption of an IRS e-file system. UTAUT has been used in prior e-government studies investigating specific technologies (Wang and Shih, 2009); however, to date the e-government literature has largely ignored the US e-file initiative.

The comprehensiveness, validity and reliability of the UTAUT model have encouraged the current authors of this study to adopt and validate it in the context of e-file adoption. The model was amended to suit the context of the study. EE is the degree of ease associated with the use of the system (Venkatesh *et al.*, 2003; Al Awadhi and Morris, 2008) The UTAUT model identifies three constructs, from the eight models, which make up the concept of EE: perceived ease of use, complexity, and ease of use (Venkatesh *et al.*, 2003) The similarity among these three variables has also been documented in prior literature (Moore and Benbasat, 1991; Thompson *et al.*, 1991; Plouffe *et al.*, 2001; Venkatesh *et al.*, 2003). The EE construct has been found to be significant in both voluntary and mandatory usage contexts, but only in the initial usage of the technology (Venkatesh *et al.*, 2003). The EE construct became insignificant after periods of extended and sustained usage, which is consistent with previous research (Thompson *et al.*, 1991; Agarwal and Prasad, 1999). According to the literature, effort-oriented constructs are usually found to be more salient in the early stages of a behavior (Venkatesh *et al.*, 2003). Regarding e-file, the government is eagerly trying to reach its goal of 80 percent. Hence, it is imperative that e-file systems are easy to use and easy to navigate. If e-file systems are too complex or require excessive cognitive effort, citizens will utilize alternative options to submit their tax returns:

H1. EE will have a significant influence on intention to use an IRS-endorsed e-file system.

Regarding performance, the literature identifies five variables that comprise the PE construct: perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations (Venkatesh *et al.*, 2003). Recent literature has shown that there are similarities between usefulness and extrinsic motivation (Venkatesh *et al.*, 2003), usefulness and job-fit (Thompson *et al.*, 1991), usefulness and relative advantage (Moore and Benbasat, 1991; Plouffe *et al.*, 2001; Venkatesh *et al.*, 2003) usefulness and outcome expectations (Compeau and Higgins, 1995; Venkatesh *et al.*, 2003), and job-fit and outcome expectations (Compeau and Higgins, 1995). PE is frequently identified as the strongest predictor of intention in previous tests (Thompson *et al.*, 1991; Compeau and Higgins, 1995; Venkatesh *et al.*, 2003). As it relates to e-file, system providers and government agencies need to emphasize the benefits of online tax filing. Once citizens understand how useful and beneficial this option is, they will be more likely to utlize e-file services:

H2. PE will have a significant influence on intention to use an IRS-endorsed e-file system.

SI is the degree to which an individual perceives that others who are deemed important to them believe that she should use the system (Venkatesh *et al.*, 2003). SI is comprised of subjective norms, social factors, and image. The construct name "social norms" has been used in prior literature and is similar to "subjective norm" within the TRA (Thompson *et al.*, 1991). This construct contains the explicit or implicit notion that people's behavior is influenced by the way in which they believe others will view them as a result of having used the technology (Venkatesh *et al.*, 2003). These effects in a mandatory context could be attributed to compliance that causes SI to have a direct effect on intention (Venkatesh *et al.*, 2003). In contrast, SI in voluntary contexts, as in this study, functions by influencing perceptions about the technology. Prior e-government literature has investigated SIs as a significant predictor of intention to use (Horst *et al.*, 2007; Hung *et al.*, 2007; Al Awadhi and Morris, 2008). Regarding e-file, people are more likely to take advantage of this option if other individuals around them whom they admire or respect also avail themselves of this service. For instance, the adoption of e-file by supervisors, mentors or friends should positively influence one's intention to use an e-file system:

H3. SI will have a significant influence on intention to use an IRS-endorsed e-file system.

Personal perceptions that impact e-file adoption

In addition to acceptance factors, we posit that personal factors will also have a significant impact on e-file adoption. One of these factors is WSSE. In general, self-efficacy is the belief "in one's capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1997, p. 3)." As per the theory of social cognition (Bandura, 1982, 1997), self-efficacy is a form of self-evaluation that influences decisions about which behaviors to take part in, the amount of effort and persistence put forth when faced with obstacles, and finally the mastery of the behavior in question (Hsu and Chiu, 2004). As a result, individuals with high self-efficacy would be more likely to perform the behavior in the future (Bandura, 1982), in the case of this study, adopt the e-file service. An important theoretical property of self-efficacy is that it is not concerned with an individual's skills. Instead, it reflects what individuals believe they can do with their skills (Hsu and Chiu, 2004). WSSE is a belief that one possesses the technology skills necessary to interact successfully with a given web site. Higher levels of WSSE increase intention to use an innovation. Regarding e-file, citizens who are confident in their ability to search for information and complete transactions online will be more likely to use this electronic service:

H4. WSSE will have a significant influence on intention to use an IRS-endorsed e-file system.

Given the impersonal nature of electronic transactions, users must believe that mechanisms are in place to keep electronic transmissions secure. PSC, also referred to as perceived security protection (Kim *et al.*, 2008), refers to a user's belief that an e-service provider will implement security measures such as authentication, encryption, and non-repudiation (Connolly and Bannister, 2008). This perception of security control is impacted by the user's understanding of the security mechanisms in place. The presence of security features such as SSL, authentication and a security policy on the service

provider's web sites illustrates that the organization is making efforts to reduce the risk associated with its electronic services (Kim *et al.*, 2008). The use of the internet to submit a tax return requires someone to submit very personal and sensitive information via the internet. There is the potential that this information could be intercepted and misused. Hence, higher levels of PSC will have a positive impact on electronic tax filing adoption:

H5. PSC will have a significant influence on intention to use an IRS-endorsed e-file system.

Finally, for e-file adoption to take place, citizens must have a level of trust in the e-file system. Trust of electronic services has been explored extensively in both e-commerce (Jarvenpaa *et al.*, 2000; Tan and Thoen, 2001; McKnight *et al.*, 2002; Gefen *et al.*, 2003; Gefen and Straub, 2003; Pavlou, 2003; Van Slyke *et al.*, 2004) and e-government (Warkentin *et al.*, 2002; Carter and Belanger, 2005; Schaupp and Carter, 2010). Research suggests that trust of an independent intermediary (TII) will have a significant impact on intention to use electronic services (Pavlou and Gefen, 2004). This construct is especially pertinent to electronic tax filing since citizens have to submit their returns via an IRS-authorized third party. Pavlou and Gefen (2004) explored this concept by testing over 200 buyers in Amazon's online auction marketplace. They state:

> Longitudinal data collected a year later show that transaction intentions are correlated with actual and self-reported buyer behavior. The study shows that the perceived effectiveness of institutional mechanisms encompasses both "weak" (market-driven) and "strong" (legally binding) mechanisms. These mechanisms engender trust, not only in a few reputable sellers, but also in the entire community of sellers, which contributes to an effective online marketplace.

The authors posit that in spite of the innate uncertainty that arises when participants of a transaction are separated by time and space, trust in an independent intermediary enables remote interaction (Pavlou and Gefen, 2004):

H6. TII control will have a significant influence on intention to use an IRS-endorsed e-file system.

Research model

Based on the aforementioned literature, we posit that three acceptance factors and three personal factors have a significant impact on taxpayers' willingness to use an e-file system. The proposed model is shown in Figure 1.

Methodology

To test the model, a survey was administered to 304 citizens in the USA. The survey was developed using existing scales in the literature. A survey enabled us to obtain the perceptions of a large number of citizens and then empirically test their responses using statistical analysis. The following sections describe the data-collection process, the sample, the instrument development, the data analysis and the results.

Data collection

Since tax filing is a phenomenon that impacts so many Americans, taxpayers were contacted in public areas and asked to participate in the study. To minimize sampling bias, we approached citizens in diverse places – including restaurants, libraries, malls,

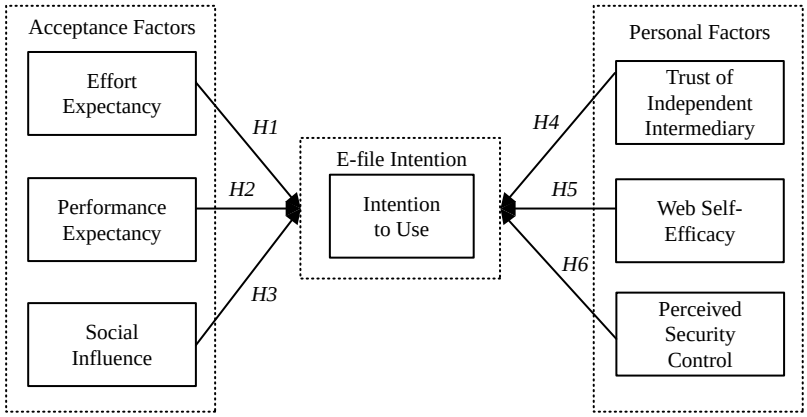

Figure 1.
Proposed research model

department of motor vehicle office, and farmers' markets – to attract participants with diverse experiences and opinions.

Sample

The survey was completed by 304 taxpayers from a Southern state in the USA. The response rate was 65 percent. Of the participants, 53 percent were female. The age range of participants was from 18 to 94 years. Of the participants, 53 percent were in the 25-34 age group. Of the participants, 89 percent were Caucasian, 93 percent had completed an e-commerce transaction, and 71 percent had completed an e-government transaction. Of the participants, 34 percent used an e-file system in 2009.

Descriptive statistics for the sample are presented in Table I.

Instrument development and validity

Questions were compiled from validated instruments in the IT adoption literature to represent each of the six constructs (Pavlou, 2003; Venkatesh *et al.*, 2003; Carter and Belanger, 2005; Fu *et al.*, 2006; Kim *et al.*, 2008; Schaupp and Carter, 2010). Responses were measured on a seven-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Demographic questions were included last on the survey so that fatigue effects would not reflected in the responses related to the six proposed constructs.

Data analysis

Constructs showed internal consistency levels exceeding 0.70 as measured by Cronbach's α (Nunnally, 1978). Table II illustrates the results of the reliability analysis

Female respondents (%)	53
Age range (years)	18-94
Caucasian (%)	89
e-commerce experience (%)	93
E-government experience (%)	71
Used e-file in 2009 (%)	34

Note: $n = 304$

Table I.
Descriptive statistics

and the total number of items used to measure each construct. Factor analysis was used to evaluate construct validity. All constructs loaded on the appropriate factors.

Before testing the proposed hypotheses, we also calculated the mean and standard deviation of each variable. These descriptive statistics presented in Table III.

Results

The research model was tested using multiple linear regression. The model explains a notable percent of the variance in citizen adoption of e-filing systems; adjusted $R^2 = 0.635$. Since the overall model was significant ($F = 88.938$, $p = 0.000$), we tested the significance of each variable. Table IV illustrates the results of hypotheses testing by showing the coefficient, t-value, and p-value of each hypothesis.

Five of the six hypotheses were supported. Three adoption factors – EE, PE, and SI – and two personal factors – PSC and WSSE – have a significant impact on intention to e-file (Figure 2). *H6*, TII, was not supported.

Table II.
Reliability analysis

Construct	No. of items	Reliability
Effort expectancy	5	0.86
Performance expectancy	2	0.74
Social influence	3	0.73
Web-specific self-efficacy	4	0.87
Perceived security control	3	0.89
Trust of an independent intermediary	4	0.89
Intention to use	3	0.77

Table III.
Regression variables

Construct	Mean	SD
Effort expectancy (EE)	5.0421	1.250
Performance expectancy (PE)	4.743	0.750
Social influence (SI)	3.289	1.412
Web-specific self-efficacy (WSSE)	5.306	1.327
Perceived security control (PSC)	4.965	1.218
Trust of an independent intermediary (TII)	4.831	1.253
Intention to use (USE)	4.854	1.679

Table IV.
Hypotheses testing

Hypoth.	Coeff.	t-val.	Sig.	Supported
H1 (EE)	0.135	1.979	0.049	Yes**
H2 (PE)	0.072	1.665	0.097	Yes*
H3 (SI)	0.213	5.421	0.000	Yes***
H4 (WSSE)	0.405	6.410	0.000	Yes***
H5 (PSC)	0.150	1.981	0.048	Yes**
H6 (TII)	0.016	0.224	0.823	No

Note: $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < .001$

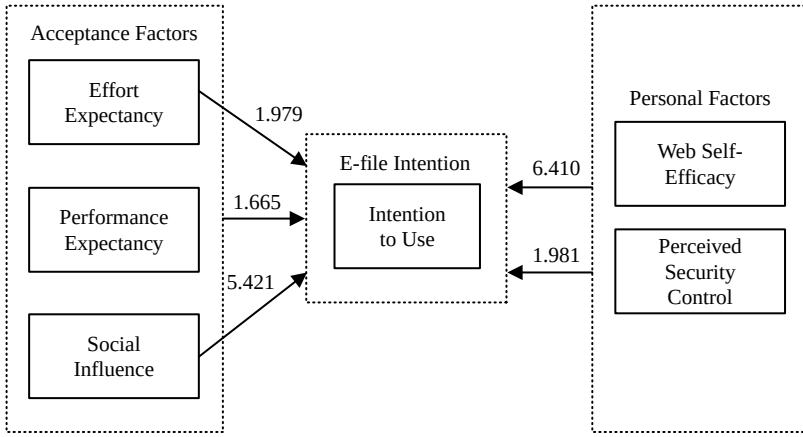

Figure 2.
Significant results with path coefficients

Discussion

This research is an investigation of taxpayers' intention to file their taxes online via an IRS-endorsed e-file system. Specifically, the investigation focused on building an integrated model that identifies the impact of certain UTAUT factors and personal perception factors on US taxpayers' intention to use an IRS-endorsed e-file system. The *RQ1* asks what are the dominate factors that significantly influence taxpayers' intention to use e-file systems. This question was addressed by testing a proposed model of e-file adoption. This proposed model included:

- three UTAUT factors (EE, PE, and SI); and
- three personal perception factors (trust of independent intermediary, WSSE, and PSC).

The overall research findings firmly support the validity of the proposed model. Specifically, five of the six proposed factors (EE, PE, SI, PSC, and WSSE) were shown to be significant predictors of taxpayers' intention to use an e-file system. These findings support the significance of the UTAUT model in predicting taxpayers' e-filing intentions. More importantly, these findings show the significant impact of personal perception factors in predicting taxpayers' e-filing intentions. The application of existing theory applied to e-filing and the identification of additional theoretical constructs that have a significant impact on e-filing intentions represents a significant contribution to current research devoted to the development and use of e-government services.

EE (i.e. ease of use), a UTAUT model construct, is a significant variable in the proposed e-file intention model. It is expected that ease of use should be a characteristic of e-filing systems in order to accommodate taxpayers, especially those who are inexperienced users. Ambali (2009) reported that the ease with which taxpayers can e-file is a significant determinant of their retention and stressed that the government should put forth efforts to make e-filing easy.

Compared to traditional channels of filing taxes, it is no surprise that known benefits connected with e-filing have a significant impact on taxpayers' intention

to adopt the online channel. The results of the proposed model show that PE, the second UTAUT model construct, is a significant factor in predicting e-file intention. According to IRS Commissioner Doug Shulman:

> IRS e-file means faster refunds. It means the option to file now and pay later if you owe additional tax. It means peace of mind knowing the IRS received the return because we send an acknowledgement (Maryland Association of CPAs, 2010).

A 1-percent error rate (reduced from 20 percent for paper returns) and secured, encrypted transmission are additional benefits associated with e-filing (Maryland Association of CPAs, 2010). Culligan *et al.* (2002) note that the perception of clients that a CPA firm is staying current with technology is a benefit to e-filing from a professional preparer's perspective. It is not surprising that taxpayers' intention to use e-filing is shown in this study to be significantly influenced by PE, i.e. the benefits taxpayers perceive are derived from e-file their taxes.

Consistent with recent research (McLeod and Pipin, 2009; Pipin *et al.*, 2010), this study shows that SI, the third UTAUT model construct, plays a significant role in taxpayers' e-file intentions. Wang (2010) posits that most people prepare their taxes using the same methods as their parents. He realized after much reflection that his tax preparation preference was greatly influenced by his father's practices when he was younger. The findings in this research support the importance of identifying and understanding the influence of parents, spouses, bosses, co-workers, friends, etc. in individual taxpayers' adoption of e-filing. More importantly, the impact of SI in the development of e-government services and in the use of these services by citizens is a fertile area for future research.

This study has taken a significant step in the continuing development of theory explaining citizens' use of e-government services (Articles Base, 2008) which is a primary contribution of this research. Two of the three personal perception variables included with the UTAUT variables in the proposed research model are found to be significant constructs. First, this research shows that taxpayers' self-efficacy, the belief about what they can do with their technical abilities to execute e-file programs, has a significant influence on their intention to use the system. Many taxpayers could possibly opt to use a professional preparer due to such factors as complexity of the return, the need for professional advice, time availability, etc. (Articles Base, 2008). The IRS.gov (2010), however, reports that during the 2010 filing season, 36 percent of all e-filers were self-preparers, an increase over the 34 percent of self-preparers reported for the 2009 filing season. This focus on taxpayer's beliefs regarding their technical skills further supports the notation that an increase in taxpayer education can have a significant impact on taxpayer self-efficacy and result in increased self-confidence and e-service use.

The second significant personal factor proposed by the researchers is perceived security, reflecting taxpayers' belief that control measures are provided when they engage in e-filing taxes. According to some organizations, "a major concern of taxpayers regarding online tax preparation e-file is the security issue – is it safe (Online Tax Pros, 2008)?" Murray (2010) comments that one of the barriers to e-filing is people being uncomfortable putting large volumes of personal data, e.g. "security numbers, incomes-out in cyberspace." It is not surprising that PSC is shown as a significant predictor of taxpayers' intention to use e-filing systems. The IRS and

e-filing vendors are challenged to focus on taxpayers' security concerns by providing relevant education and including software controls.

The third personal perception factor, trust in an independent intermediary, was not found to be a significant construct in the proposed model. Perhaps, given the salience of efficacy and PSC, trust begins to wane. This finding may also be due to the nature of our sample. 93 percent have completed an e-commerce transaction and 71 percent have completed an e-government transaction. Future research should continue to explore the role of trust in e-service adoption using a diverse group of participants. Perhaps, the more commonly explored trust constructs, such as institution- or characteristic-based trust, are more salient.

The significant performance of the proposed model in this research suggests its future application in research investigating citizens' use of various other e-services programs, e.g. e-voting. Future research should also expand the proposed model to include antecedents of the significant constructs. For instance, it would be valuable to researchers and practitioners to identify the factors that influence one's WSSE and PSC.

Research synthesis

The proposed model investigated in this study is founded in the technology-adoption literature and reports findings that are supported by this literature. The body of research based on this literature has supported the validity of intention/usage as the dependent variable in studies that focus on intention to use. In particular, the UTAUT serves as a guiding framework for our conceptual development. While e-filing is not necessarily a new technology due to its 20-year life, it is gradually increasing in utilization by taxpayers, thus making it a new technology for novice e-file users. Consistent with past UTAUT literature, three of the four core determinants of usage intention (effort, performance, and SI) included in this study are shown to be significant in projecting taxpayers' adoption of e-file systems.

This research further contributes to the literature by integrating three determinants from the UTAUT model with three personal perception determinants proposed by the researchers. Moreover, this research supports the belief that future research must focus more on the characteristics, beliefs, values, etc. of potential users of government provided e-services. In addition, government must focus on potential users of the e-services and not merely on characteristics of the e-services to be provided. The proposed model investigated three personal determinants related to trust, security, and skill. While trust was not found to be a significant determinant, the findings of this research extend the literature and show that security and skill (along with effort, performance, and SI, UTAUT constructs) are key determinants that explain taxpayers' adoption of IRS-endorsed e-file systems. This merging of UTAUT theory with theories such as social cognition (efficacy), and other theories that emphasize human perception, is the future direction that must be taken by researchers in an effort to understand taxpayers' intentions to adopt e-file systems and other government provided e-services.

There are limitations to this research that should be addressed in future studies. First, it is recognized that the population of participants in the research lacks diversity. Caucasian participants make up 89 percent of the total participants. This concentration of participants leads to reduced variation in socio-economic levels, cultural beliefs, values, etc. The proposed model should be investigated using input from a more

diverse population of participants. In addition, the population of participants, which was limited to one geographical area in this study, should be extended to include citizens in other geographical areas. This regional expansion will further increase the variation in participants and their responses.

Conclusion

The IRS electronic tax filing system is in its 20th year of implementation. The government's goal is to have 80 percent of all taxpayers utilize an e-file system. While the government has invested a tremendous amount of resources into the development and enhancement of e-file systems over the years, only about two-thirds of all taxpayers file their taxes electronically. To assist the government in reaching its 80 percent goal, there is a need for more research that integrates theories and identifies determinants that influence taxpayers' intentions to e-file. The findings from this research will significantly assist government in achieving its goals.

Specifically, the findings of this research strongly suggest that government not only focus on technology-related characteristics of the e-service, but more importantly, place more attention on the characteristics of potential e-service users, e.g. their value, beliefs, skills, etc. This study responds to the challenge and identifies five determinants (three UTAUT models factors and two personal perception factors) that significantly influence taxpayers' utilization of e-file systems. Consistent with past research, the integrated research model shows that UTAUT factors are significant. This study also reports that personal perception factors related to self-efficacy and security have a significant effect on taxpayers' intentions to e-file.

In light of the impact of usage intention and personal perception factors on the adoption of e-filing, the government is challenged to develop e-file systems that satisfy the needs, desires, and perceptions of taxpayers. More research is needed to expand acceptance models to determine how adoption factors interact, how antecedents of salient predictors impact intentions, and how additional personal perceptions and abilities impact taxpayer intentions. The creation and validation of such models will lead to significant enhancements in the development and implementation of e-file systems.

References

Agarwal, R. and Prasad, J. (1999), "Are individual differences germane to the acceptance of new information technologies?", *Decision Sciences*, Vol. 30 No. 2, pp. 361-91.

Al Awadhi, S. and Morris, A. (2008), "The use of the UTAUT model in the adoption of e-government services in Kuwait", paper presented at Hawaii International Conference on System Sciences, Kona Hawaii.

Ambali, A.R. (2009), "E-government policy: ground issues in e-filing system", *European Journal of Social Sciences*, Vol. 11 No. 2, pp. 249-66.

Articles Base (2008), "Should you hire a tax professional to prepare your taxes", available at: www.articlesbase.com/taxes-articles/should-you-hire-a-tax-professional-to-prepare-your-taxes

Bandura, A. (1982), "Self-efficacy mechanism in human agency", *American Psychologist*, Vol. 37 No. 2, pp. 122-47.

Bandura, A. (1997), *Self-efficiacy: The Exercise of Control*, Freeman, New York, NY.

Baumgarten, J. and Chui, M. (2009), "E-government 2.0", *McKinsey on Government*, Vol. 4, Summer, pp. 26-31.

Bélanger, F. and Carter, L. (2009), "The impact of the digital divide on e-government use", *Communications of the ACM*, Vol. 52 No. 4, pp. 132-5.

Carter, L. and Belanger, F. (2005), "The utilization of e-government servicers: citizen trust, innovation and acceptance factors", *Information Systems Journal*, Vol. 15 No. 1, pp. 2-25.

Compeau, D.R. and Higgins, C.A. (1995), "Computer self-efficacy: development of a measure and initial test", *MIS Quarterly*, Vol. 19 No. 2, pp. 189-211.

Connolly, R. and Bannister, F. (2008), "Factors influencing Irish consumers' trust in internet shopping", *Management Research News*, Vol. 31 No. 5, pp. 339-58.

Culligan, M., Scutellard, J.F. and Szarowicz, L.A. (2002), "It's time to e-file", *Journal of Accountancy*, Vol. 194, November.

Federal Computer Weekly Staff (2010), "Data mining: government spending by the numbers", available at: http://few.com/Articles/2010/2002/2008/DATA-MINING-egov-satisfaction-IT-spending.aspx?p=2011

Fletcher, P.D. (2002), *E-file: Electronic Tax Administration in the United States*, Center for Technology in Government, Albany, NY.

Fu, J.R., Farn, C.K. and Chao, W.P. (2006), "Acceptance of electronic tax filing: a study of taxpayer intentions", *Information Management*, Vol. 43 No. 1, pp. 109-26.

Gefen, D. and Straub, D.W. (2003), "Managing user trust in B2C e-services", *e-Service Journal*, Vol. 2 No. 2, pp. 7-24.

Gefen, D., Karahanna, E. and Straub, D.W. (2003), "Trust and TAM in online shopping: an integrated model", *MIS Quarterly*, Vol. 27 No. 1, pp. 51-90.

Guijarro, L. (2007), "Interoperability frameworks and enterprise architectures in e-government initiatives in Europe and the United States", *Government Information Quarterly*, Vol. 24 No. 1.

Horst, M., Kuttschreuter, M. and Gutteling, J. (2007), "Perceived usefulness, personal experiences, risk perception and trust as determinants of adoption of e-government services in The Netherlands", *Computers in Human Behavior*, Vol. 23 No. 4, pp. 619-32.

Hsu, M.H. and Chiu, C.M. (2004), "Internet self-efficacy and electrtonic service acceptance", *Decision Support Systems*, Vol. 38, pp. 369-81.

Hung, Y.-H., Wang, Y.-S. and Chou, S.C.T. (2007), "User acceptance of e-government services", paper presented at 11th Pacific-Asia Conference on Information Systems, Auckland.

IRS.gov (2010), *2010 Filing Season Statistics*, available at: http://222.irs.gov/newsroom/article/220,id=220953,220900.html

Janssen, M., Chun, S.A. and Gil-Garcia, J. R. (2009), "Building the next generation digital government infrastructures", *Government Information Quarterly*, Vol. 26, pp. 233-7.

Jarvenpaa, S.L., Tractinsky, N. and Vitale, M. (2000), "Consumer trust in an internet store", *Information Technology and Management*, Vol. 1 Nos 1/2, pp. 45-70.

Kim, D.J., Ferrin, D.L. and Rao, H. (2008), "A trust-based consumer decisoin-making model in electronic commerce: the role of trust, perceived risk, and their antecedents", *Decision Support Systems*, Vol. 44, pp. 544-64.

McKnight, H.D., Chaudhury, V. and Kacmar, C. (2002), "Developing and validating trust measures for e-commerce: an integrative typology", *Information Systems Research*, Vol. 13 No. 3, pp. 334-59.

McLeod, A. and Pipin, S. (2009), "Individual taxpayer intention to use tax preparation software: examining expertise, experience, trust and perceived risk", *Journal of Information Science and Technology*, Vol. 6 No. 1.

Maryland Association of CPAs (2010), "IRS e-file, free file now open. Blog: CPA success", available at: http://216.230.110.275/content/printpreview.aspx

Maurer, S. (2010), "Understanding the role of e-government and e-governance".

Moore, G. and Benbasat, I. (1991), "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, Vol. 2 No. 3, pp. 192-222.

Murray, T. (2010), "As e-filing turns 20, IRS trying to win over remaining third of taxpayers from paper returns", available at: www.cleveland.com/business/index.ssf/2010/2002/as_e-filing_turns_2020_irs_tryin.html

National Audit Office Report (2007), *Government on the Internet: Progress in Delivering Information and Services Online*, National Audit Office Report, London.

Nunnally, J.C. (1978), *Psychometric Theory*, McGraw-Hill, New York, NY.

Online Tax Pros (2008), "Is online tax preparation and e-file safe and secure?", available at: http://onlinetaxpros.com/?page=tax_help_articles_eng/online_tax_preparation_/efile/article

Pavlou, P. (2003), "Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model", *International Journal of Electronic Commerce*, Vol. 7, pp. 69-103.

Pavlou, P. and Gefen, D. (2004), "Building effective online marketplaces with institution based trust", *Information Systems Research*, Vol. 15 No. 1, pp. 37-59.

Pipin, S., McLeod, A. and Catania, V. (2010), "What's important to tax software users?", *The CPA Journal*, February, pp. 68-72.

Plouffe, C.R. and Hulland, J.S. (2001), "Research report: richness versus parsimony in modeling technology adoption decisions-understanding merchant adoption of a smart card-based payment system", *Information Systems Research*, Vol. 12 No. 2, pp. 208-22.

Rozen, T. (2009), "Does e-file increase your IRS audit risk? The truth revealed", *Ezine Articles*, November.

Schaupp, L.C. and Carter, L. (2010), "The impact of trust, risk and optimism bias on e-file adoption", *Information Systems Fronteirs*, Vol. 12 No. 3, pp. 299-309.

Schaupp, L.C., Carter, L. and McBride, M.E. (2010), "E-file adoption: a study of US taxpayers' intentions", *Computers in Human Behavior*, Vol. 26 No. 4, pp. 636-44.

Tan, Y.H. and Thoen, W. (2001), "Toward a generic model of trust for electronic commerce", *International Journal of Electronic Commerce*, Vol. 5 No. 2, pp. 61-74.

Teodora, V. (2008), "The role of e-government in the rise of administrative efficiency", *EconPapers*, available at: http:/econpapers.repec.org/paper/pramprapa/12155.htm

Thompson, R.L., Higgins, C.A. and Howell, J.M. (1991), "Personal computing: toward a conceptual model of utilitzation", *MIS Quarterly*, Vol. 15 No. 1, pp. 124-43.

Van Slyke, C., Belanger, F. and Communale, C. (2004), "Adopting business-to-consumer electronic commerce: the effects of trust and perceived innovation characteristics", *The Data Base for Advances in Information Systems*, Vol. 35 No. 2, pp. 32-9.

Venkatesh, V., Morris, M., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-78.

Wang, J. (2010), "Your take: how do you prepare your taxes?", available at: www.bargaineering.com/articles/your-take-how-do-you-prepare-your-taxes.html

Wang, Y.S. and Shih, Y.W. (2009), "Why do people use information kiosks? A validation of the unified theory of acceptance and use of technology", *Government Information Quarterly*, No. 26, p. 1.

Warkentin, M., Gefen, D., Pavlou, P. and Rose, G. (2002), "Encouraging citizen adoption of e-government by building trust", *Electronic Markets*, Vol. 12 No. 3, pp. 157-62.

West, D.M. (2008), *State and Federal Electronic Government in the United States*, Governance Studies at BROOKINGS, Washington, DC.

Further reading

Teo, T.S., Srivastava, S.C. and Jiang, L. (2009), "Trust and electronic government success: an empirical study", *Journal of Management Information Systems*, Vol. 25 No. 3, pp. 99-131.

Appendix. Survey items

Performance expectancy

(1) The advantages of internet tax filing will outweigh the disadvantages.

(2) Overall, using internet tax filing will be advantageous.

Effort expectancy

(1) Learning to use an internet tax-filing method would be easy for me.

(2) I would find an e-file system easy to use.

(3) It would be easy for me to input and modify data when I use an e-file system.

(4) Instructions for using an e-file system will be easy to follow.

(5) Using an e-file system would make filing my taxes clearer and more understandable.

Social influence

(1) People who influence my behavior think that I should use an e-file system.

(2) People who are important to me think that I should use an e-file system.

(3) People around me who use the e-file system to file their taxes have more prestige.

Intention to use

(1) I predict I will use an e-file system in the future.

(2) Filing my taxes via an IRS-endorsed e-file system is something that I would do.

(3) I would use the internet to file my taxes.

Trust in an intermediary

(1) As a certified e-file service provider, TurboTax can be trusted at all times.

(2) As a certified e-file service provider, TurboTax can be counted on the do what is right.

(3) As a certified e-file service provider, TurboTax has high integrity.

(4) TurboTax is competent and knowledgeable about electronic tax filing.

Perceived security control

(1) TurboTax implements security measures to protect its online tax filers.

(2) TurboTax usually ensures that transactional information is protected from being accidentally altered or destroyed during transmission on the internet.

(3) I feel secure about the electronic filing system of TurboTax.

Web-specific self-efficacy

(1) I feel confident in my ability to file income tax returns over the internet.

(2) I feel confident in my ability to navigate the e-file web site by following hyperlinks.

(3) I feel confident in my ability to navigate through the data-collection screens on an e-file web site.

(4) I feel confident in my ability to fill out and submit income tax forms electronically.

Corresponding author
Lemuria Carter can be contacted at: ldcarte2@ncat.edu